MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2015/2016

PAM0135 –ALGEBRA

(Foundation in Information Technology / Life Sciences)

5 MARCH 2016
2.30 p.m. – 4.30 p.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of **TWO** pages excluding the cover page and the Appendix.

2. Answer **FIVE** out of **SIX** questions. All questions carry equal marks and the distribution of the marks for each question is given.

3. Please write all your answers in the Answer Booklet provided.

4. All necessary working steps **MUST** be shown.

Instruction: Answer **FIVE** out of **SIX** questions.

Question 1 [10 marks]

Simplify the expressions:

a. $\dfrac{1+\dfrac{x}{y}}{1-\dfrac{x^2}{y^2}}$ (3 marks)

b. $x-\dfrac{x^2}{x+2}+\dfrac{2}{x-2}$ (5 marks)

c. $\left(\sqrt[3]{81x^5y^{10}}\right)\left(\sqrt[3]{9xy^2}\right)$ (2 marks)

Question 2 [10 marks]

a. Solve the equation: $\dfrac{5}{\sqrt{x+1}}-3\sqrt{x+1}+2=0$ (4 marks)

b. Solve the following inequalities:

i. $2-|3-4x|<-5$ (3 marks)

ii. $\dfrac{4+2x}{x-2}\le 6$ (3 marks)

Question 3 [10 marks]

a. Given $f(x)=\dfrac{2x-10}{\sqrt{x-3}}$ and $g(x)=x^2+3$.

i. Identify the domain of $f(x)$ and $g(x)$. (2 marks)

ii. Find $\dfrac{(f-g)(4)}{g(3)}$. (2 marks)

iii. Find $(g\circ g)(x)$. (2 marks)

b. Given the function $f(x)=x^2+6x-9$. Find the vertex, the x-intercepts and the y-intercept of the graph of f. (4 marks)

Continued...

Question 4 [10 marks]

a. Given $f(x)=\sqrt{x-2}, x \geq 2$ and $g(x)=x^2+2, x \geq 0$.

i. Find $f(g(x))$ and $g(f(x))$. (2 marks)

iii. Sketch the graph of both functions on the same xy-plane. Show at least 2 points on each graph. (4 marks)

b. Find the quotient and the remainder when $f(x)=5x^5-39x^3+2x^2-50x-36$ is divided by $x-3$. (4 marks)

Question 5 [10 marks]

a. Sketch the graph of the function $f(x)=\log_3(x+2)$. Identify the x-intercept, the y-intercept and the vertical asymptote. State the domain and range of f. (5 marks)

b. Solve the equations:

i. $\ln(x-1)+\ln 4=\ln(2x+4)-\ln 2$ (3 marks)

ii. $e^{3x-1}=16$ (2 marks)

Question 6 [10 marks]

a. In the expansion of $(2x+3)^{12}$, find

i. the coefficient of x^8. (2 marks)

ii. the first three terms of the expansion. (3 marks)

b. Given that the third term and the eighth term of an arithmetic sequence are 12 and -43 respectively. Find the first term and the common difference of the arithmetic sequence. Hence, find the sum of the first 20 terms of the sequence. (5 marks)

End of Page

APPENDIX

$a^2 - b^2 = (a-b)(a+b)$

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$

$a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

$(a+b)^2 = a^2 + 2ab + b^2$

$(a-b)^2 = a^2 - 2ab + b^2$

$(a-b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$

$(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$

$\log_b b = 1$

$\log_b 1 = 0$

$\log_b (MN) = \log_b M + \log_b N$

$\log_b \left(\frac{M}{N}\right) = \log_b M - \log_b N$

$\log_b M^p = p \log_b M$

$\log_b M = \frac{\log_a M}{\log_a b}$

$a_n = a_1 + (n-1)d$

$a_n = a_1 r^{n-1}$

$S_n = \frac{n}{2}(2a_1 + (n-1)d) = \frac{n}{2}(a_1 + a_n)$

$S_n = \frac{a_1(1-r^n)}{1-r}$

$S = \frac{a_1}{1-r}$, infinite sum $|r| < 1$